Virginia Cooperative Extension

2003

Forestry

PUBLICATION 420-407

Reforestation in the Absence of Cost-Share: Does It Pay?

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Introduction

Throughout Virginia, non-industrial private forestland owners hold millions of acres of valuable timberland. These individuals manage their forestland for a variety of objectives, including income, recreation, wildlife management, and other activities. Foresters and experienced landowners know that encouraging prompt regeneration is an important part of maintaining productive timberland.

For decades, state and federal cost-share programs have been available to help landowners with pine reforestation expenses. For example, the Virginia Department of Forestry administers the Reforestation of Timberlands (RT) Program. This program reimburses landowners for 35% of their reforestation expenses, up to a maximum of $60 per acre.

Incorporating cost-share programs when reforesting is an excellent strategy that can increase a landowner's rate of return on investment. In fact, cost-sharing is so attractive that some landowners may decide to delay reforestation a year—or more—if cost-share money has run out for the current year. This publication illustrates the financial impact of key landowner decisions regarding prompt reforestation with and without cost-share, and the effect of delaying reforestation one year due to an absence of cost-share funds.

Assumptions

Assumptions are a necessary part of any financial analysis. **Changes in site index, timber prices, management regime, reforestation costs, and other factors will all impact the rate of return on investment.** The investment returns presented in this publication are based on the following management assumptions.

1. The financial projections that serve as the foundation for the cost-share analyses utilize a Southern piedmont loblolly pine plantation. The plantation grown is located on average quality land. The site index—measure of soil productivity—of the timberland is 60 feet at a base age of 25. This means that the dominant trees will be 60 feet tall when they reach 25 years of age. This is a typical site index for loblolly pine in the Virginia Piedmont.

2. The tract was site prepared and planted with 600 trees per acre of second generation, genetically improved seedlings. This planting density is commonly recommended today, although more or fewer trees per acre may be planted depending on landowner objectives. Genetically improved seedlings will grow faster and create higher quality wood. Therefore, we have increased the site index to 67 for modeling purposes.

3. In our examples, we assumed that the landowner was interested in growing trees for large sawtimber. The three cases are based on a forest management regime that utilizes two thinnings prior to the final harvest. The first thinning is performed in year 18, the earliest feasible point in this rotation. This timing is due to harvesting limitations that require the thinning to produce a minimum of 26 tons (~10 cords) of fiber per acre to ensure an economically viable logging operation. The second thinning is conducted in year 27, and the final harvest occurs at an optimal rotation length of 35 years. This rotation length maximizes the plantation's financial return under the current management regime.

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4. Harvest volume information was obtained from the growth and yield model PCWTHIN 2.1. This model predicts cord and International 1/4 MBF (thousand board feet) volumes that were subsequently converted to tons. The cordwood volumes were converted to tons using a conversion factor of 2.68 tons per standard pine pulpwood cord. The sawtimber volumes were converted to tons using 6 tons per thousand board feet. Weight measurements are used due to prevalence in current markets and to ensure data consistency. The conversions were also necessary to standardize data for entry into the forest finance spreadsheet.

5. A forest finance spreadsheet is used to calculate Net Present Value (NPV), Land Expectation Value (LEV), Equal Annual Equivalent (EAE), and Internal Rate of Return (IRR) decision criteria. The spreadsheet utilizes prices, costs, discount rate (except for IRR), harvest volumes, and/or rotation length to solve for the decision criteria. The decision criteria are defined below:

   - Net Present Value represents the present value of a management regime by discounting future revenues and future costs back to the present for one investment period (rotation). When NPV is positive an independent investment project will yield a financial gain. A positive NPV directly corresponds to a landowner's net increase in wealth for every acre of forest managed under that management option.

   - Land Expectation Value expresses the dollar amount that a landowner can afford to pay for bare land to grow infinite rotations of tree crops if he or she does not already own the land.

   - Equal Annual Equivalent values represent the single annual payment that will equal net present value over the life of the timber investment. EAE allows one to compare periodic returns of different lengths (i.e., forestry rotations of 33 and 40 years) and alternative investments such as forestry vs. agricultural crops to determine the best use of the land.

   - Internal Rate of Return represents the average annual rate of return for an investment given the present and future costs and revenues. It is calculated by setting discounted revenues equal to discounted costs and solving for the compound discount rate.

6. Stumpage values—the price paid for standing timber—represent Virginia Region 2 averages for pine pulpwood, chip-n-saw and sawtimber as reported by Timber-Mart South. Our price figures represent the average of Timber-Mart South prices reported over a three-year period (1st Quarter 1999 through 4th Quarter 2001).

7. Reforestation costs for site preparation and planting are $75 per acre. This represents the weighted average costs of straight plant and burn/plant reforestation projects conducted during the year 2001 in Halifax County, Virginia (Layman 2002). Herbicide release costs are $70 per acre.

8. Taxes and land management costs of $7.50 per acre are based on average annual property taxes and management expenses for Virginia.

9. The discount rate is 6% real (net of inflation). This represents the anticipated return from an alternative investment, such as long-term CD's, bonds, or stocks.

Results

Three cases were developed that reflect reforestation options commonly faced by Virginia forest landowners.

Case 1 represents prompt reforestation without government assistance. In this scenario, the landowner invests 100% of his or her own money in the future stand ($75/acre to reforest the stand, followed by $70/acre in two years for herbicide release treatment) (Table 1). Results for NPV ($470.32), LEV ($540.66), EAE ($32.44), and IRR (10.5%) values are all positive, indicating that this is a worthwhile investment under the assumed conditions.

Case 2 represents prompt reforestation with cost-share assistance. In this case, the landowner is aided with a 35% cost-share payment at the beginning of the year following harvest. This cost-share payment reduces costs of reforestation and herbicide release to $48.75 and $45.50, respectively (Table 2). Now, NPV ($518.37), LEV ($595.90), EAE ($35.75), and IRR (11.6%) are not only positive, but also more attractive than the returns shown in Case 1.

Case 3 illustrates a landowner who postponed stand establishment by one year due to an absence of cost-share funding, or some other factor, such as reluctance to re-invest timber sale proceeds. The landowner is hoping to receive cost-share payments next year, and we'll assume that he or she does. Although cost-share assistance remained at 35%, reforestation costs

increased to $250 per acre because revegetation from weeds, vines, and stump sprouts required more intensive site-preparation to deal with the increased competition. The landowner expects to receive a 35% cost-share payment of $87.50 per acre. Under RT, however, the maximum allowable payment is $60 per acre. As a result, the landowner's reforestation costs become $190 per acre (Table 3).

Delaying stand establishment by one year means that thinnings and final harvest each occur one year later than in previous cases. The ($32.44) cost in Year 0 is foregone revenue that is lost by delaying reforestation one year. Although this is not an out-of-pocket cash flow, the landowner is worse off by delaying, compared to Case 1 or Case 2. Delaying reforestation one year with cost-share resulted in decreased values for NPV ($354.46), LEV ($404.06), EAE ($24.24), and IRR (8.8%).

Overall, results show that Case 2 has the most favorable return due to the availability of cost-share assistance (Table 4). The net present value of Case 2 is $48.05 larger than the net present value of Case 1. Case 3 illustrates that it is not in the landowner's best interest to delay reforestation if cost-share money has run out. When any landowner postpones stand establishment, he or she loses potential income due to the cost of lost production and the increase in establishment costs.

Summary

A timberland owner achieves the best financial results by utilizing existing cost-share programs and reforesting during the planting season immediately following a harvest. However, analyses show that keeping timberland productive, with or without cost-share assistance, is superior to delaying one or more years if cost-share payments are unavailable. By delaying reforestation, the landowner foregoes income for that year and also realizes an increase in stand establishment costs. Establishment costs usually increase proportionally up to three years following harvest. From three to ten years post harvest reforestation costs remain relatively constant, when one must drum chop, burn, and spray prior to planting.

Reforestation should be an integral part of the timber harvesting and marketing decision. To maximize income and provide for future generations, landowners should always reforest with funds generated either from timber harvests, loans, or other resources, whether or not cost-share monies are available.

Reforestation Pays…But Don't Delay!

Acknowledgments

The authors thank Virginia Department of Forestry Area Foresters Doug Audley (Amelia County), Larry Layman (Halifax County), and Don Yancey (Campbell County), and Jim Willis (Extension Agent, Forestry, Southwest Extension District) for critical review of this publication.

Table 1: Case 1 - Assumptions, expenses, and revenues for prompt reforestation without cost-share.

Year	Treatment description	Future silviculture costs ($/acre)	Future land mng't costs[1] ($/acre)	Future silviculture revenue[2] ($/acre)	Pulpwood harvest volume (tons/acre)	Chip-N-Saw harvest volume (tons/acre)	Large sawtimber harvest volume (tons/acre)	Net cash flow ($/acre)	Discounted cash flow ($/acre)
0	N/A	(75.00)	-	-	0.0	0.0	0.0	(75.00)	(75.00)
2	Herbicide Release	(70.00)	(7.50)	-	0.0	0.0	0.0	(77.50)	(68.97)
18	First Thinning	-	(7.50)	279.44	31.9	0.0	0.0	271.94	95.27
27	Second Thinning	-	(7.50)	583.23	12.3	20.7	0.0	575.73	119.39
35	Final Harvest	-	(7.50)	3,823.90	5.9	2.5	107.8	3,816.40	496.53

[1]Land management costs of $7.50 occur annually from Year 1 through Year 35.
[2]Calculated using the following values: $8.76/ton (pulpwood), $22.97/ton (chip-n-saw), $34.46/ton (large sawtimber).

Table 2: Case 2 - Assumptions, expenses, and revenues for prompt reforestation with cost-share.

Year	Treatment description	Future silviculture costs ($/acre)	Future land mng't costs[1] ($/acre)	Future silviculture revenue[2] ($/acre)	Pulpwood harvest volume (tons/acre)	Chip-N-Saw harvest volume (tons/acre)	Large sawtimber harvest volume (tons/acre)	Net cash flow ($/acre)	Discounted cash flow ($/acre)
0	N/A	(48.75)	-	-	0.0	0.0	0.0	(48.75)	(48.75)
2	Herbicide Release	(45.50)	(7.50)	-	0.0	0.0	0.0	(53.00)	(47.17)
18	First Thinning	-	(7.50)	279.44	31.9	0.0	0.0	271.94	95.27
27	Second Thinning	-	(7.50)	583.23	12.3	20.7	0.0	575.73	119.39
35	Final Harvest	-	(7.50)	3,823.90	5.9	2.5	107.8	3,816.40	496.53

[1]Land management costs of $7.50 occur annually from Year 1 through Year 35.
[2]Calculated using the following values: $8.76/ton (pulpwood), $22.97/ton (chip-n-saw), $34.46/ton (large sawtimber).

Table 3: Case 3 - Assumptions, expenses, and revenues for delayed reforestation with cost-share.

Year	Treatment description	Future silviculture costs ($/acre)	Future land mng't costs[1] ($/acre)	Future silviculture revenue[2] ($/acre)	Pulpwood harvest volume (tons/acre)	Chip-N-Saw harvest volume (tons/acre)	Large sawtimber harvest volume (tons/acre)	Net cash flow ($/acre)	Discounted cash flow ($/acre)
0	N/A	(32.44)	-	-	0.0	0.0	0.0	(32.44)	(32.44)
1	Planting & Site Preparation	(190.00)	(7.50)	-	0.0	0.0	0.0	(197.50)	(186.32)
19	First Thinning	-	(7.50)	279.44	31.9	0.0	0.0	271.94	89.88
28	Second Thinning	-	(7.50)	583.23	12.3	20.7	0.0	575.73	112.63
36	Final Harvest	-	(7.50)	3,823.90	5.9	2.5	107.8	3,816.40	468.43

[1]Land management costs of $7.50 occur annually from Year 1 through Year 36.
[2]Calculated using the following values: $8.76/ton (pulpwood), $22.97/ton (chip-n-saw), $34.46/ton (large sawtimber).

Table 4. Net present value, land expectation value, equal annual equivalent, and internal rate of return for reforestation scenarios with—and without—cost-share.[1]

Case	NPV ($/acre)	LEV ($/acre)	EAE ($/acre)	IRR (%)
Case 1. Reforestation without cost-share.	470.32	540.66	32.44	10.5
Case 2. Reforestation with cost-share.	518.37	595.90	35.75	11.6
Case 3. Reforestation with cost-share delayed 1 year.	354.46	404.06	24.24	8.8

[1]Results for Case 1 and Case 2 are comparable since the investment horizons are of equal length; but Case 3 is one year longer and adjustments must be made before it can be compared directly with Case 1 or Case 2. Use LEV and EAE to compare results among the three cases since these criteria have a common investment horizon – infinity.